tissue. 2. The tracheal capillaries very rarely end abruptly (blind) in the phosphorescent organs, but most frequently anastomose with one another, forming an irregular meshwork. 3. The capillaries do not seem to enter into the structure of the parenchymatous cells, but rather course along their surface, often irregularly winding around and enveloping these. 4. The tracheal terminal cells are nothing more than the outer elements of the peritoneal layer at the base of tracheal capillaries, which radiate in a brush-like fashion from a chitinous spiral trachea. 5. The tracheal terminal cells are not the seat or point of departure of the light development. If this appears first in their vicinity it is only a consequence of the fact that these structures have, owing to their affinity for oxygen, stored up in themselves a supply of this gas, and give it off in greater quantity to the neighboring tissues. 6. The light-producing function is peculiar to the parenchyma cells of the light-producing organs. It results from a slow oxydation of a substance formed by them under the control of the nervous system. 7. The ventral light-organ was found to consist of two layers, the parenchyma-cells of which are quite similar to one another in their morphological characters, but they differ from one another in the chemical nature of their contents. 8. The parenchymatous cells (is this the case with all?) seem connected with fine nerve-endings. 9. The light-organs are the morphological equivalents of the fatty bodies.

PSYCHOLOGY.

DREAMS.—

"We are such stuff
As dreams are made on."—*The Tempest.*

Shakespeare's lines may serve as the expression of a curious and important psychological truth. We may truly and philosophically be said to think and perceive, and therefore to exist exactly as dreams are made. For the only existence which we know is that presented to us in consciousness according to certain laws which prescribe precisely how we are to be conscious, not only of the outside world which comes to consciousness through the senses, but also of the internal world of our own mind.

For example, it is impossible for the mind to think intelligibly anything entirely by itself independent of all cause or effect; it is impossible to think a sensation such as coolness or a color like blue by themselves without any substance which is cool or body that is blue.

It is to this law of thought that dreams owe their origin; and which in their turn they serve to illustrate and explain as in other mental phenomenon can.

Let us take for example one of the commonest classes of dreams. It is a warm night, and a man is sleeping at an open window. At first all the senses are unexcited, and he sleeps

dreamlessly. Now let a sudden strong wind spring up as sometimes happens; the air strikes the sleeper and chills him. The sensitive nerves of the skin are excited, and transmit their excitement to the sleeping brain where it appears as a sensation. But the rest of the brain is asleep, the nerves of hearing, of seeing, of smelling unexcited, give no sensations, and thus the brain has nothing given to it but this single sensation—coolness.

Observe what happens; a dream forms itself in the brain of the sleeper, which takes shape something like this. He is in a boat or a bridge or the shore of a stream, he is fishing, sailing, gunning, whatever has last occupied his mind, and will serve, and then by some logical chain of events, he finds himself plunged in the cold water. A shiver runs through him, and he awakes.

In this way the sensation of coolness which the nerves of the skin have transmitted to the brain is thought; that is to say the sensation of coolness having been forced into consciousness, and demanding to be thought some function of the mind has set to work to make the thinking of it possible, and has invented this little story of the sailing and the cold water for that purpose.

However long the story invented may apparently be, in reality the invention of it is as instantaneous as a flash of lightning, showing that the act of the mind is simply the effort to think the sensation presented to its consciousness, and is but a single act, not a continuous chain of acts.

There is a story told of a sleeper awakened by the violent slamming of a door. Between the hearing of the noise and his awaking, he dreamed he had entered the army, had been sent to war, had deserted, had been captured, and was about to be shot. The discharge of the guns that were to kill him, wakened him, and was the sound of the door that had actually been slammed. His dream had occupied the space of time between hearing the sound and his awakening.

Dreams, then, in their philosophical aspect may be defined as the attempt of the understanding[1] to think a sensation by placing it in connection with other sensations which it invents for the purpose when deprived by slumber of the aid of the other senses. In such a position the understanding unable to make a conception or picture—which is necessary for intelligent thought—out of a single sensation is compelled by the law of its operation to gather together sensations which it accordingly invents for itself in order that it may have sufficient material for a conception. These sensations, which it invents, are naturally those which are found usually in connection with the sensation it is engaged in trying to think.

Of course when the dreamer awakes, his understanding at once

[1] I have taken the liberty of using the terms employed by Kant in his Kritik of Pure Reason, the most perfect, as I believe it is the only complete treatise on these obscure but important processes of thought.

and almost mechanically sets to work to form a new conception out of the real sensations which are then presented to consciousness, and discards the old conception which it had made out of invented sensations.

The same process, only in a fainter and less noticeable way, takes place occasionally in our waking hours, when, for example, in hearing a sudden noise, we exclaim, "I cannot understand that!" For in such a case the understanding is left with only this one sensation out of which to make as conception. But being fully awake, the understanding of the man does not go on to invent sensations, but it waits and makes no attempt to think the noise until it receives sufficient real sensations out of which to make a conception.

As for example, the noise is heard as the man is walking in a forest, and not having sufficient sensations for a conception, he turns around and looks and sees a man with a gun smoking or a tree just fallen or a wagon, and thus having with his eyes added other sensations his understanding is enabled out of the material gathered to make an intelligent conception.—*T. B. Stork.*

FRITZ MÜLLER ON THE INHERITANCE OF TRADITIONS AMONG SOCIAL INSECTS.—In a letter to *Nature*, Fritz Müller, referring to Mr. C. Lloyd Morgan's excellent paper on animal intelligence (*Nature*, vol. XXVI., p. 523), quotes from him as follows: "The brute has to be contented with the experience he inherits or individually acquires. Man, through language, spoken or written, profits by the experience of his fellows. Even the most savage tribe has traditions extending back to the father's father. May there not be, in social animals also, traditions from generation to generation, certain habits prevailing in certain communities in consequence neither of inherited instincts nor of individual experience, but simply because the young ones imitate what they see in their elder fellows?"

Müller then adds: "As is well known, the stingless honey-bees (Melipona and Trigona) build horizontal combs consisting of a single layer of cells, which, if there is plenty of space, are of rather regular shape, the peripheral cells being all at about the same distance from the first built central one. Now, on February 4, 1874, I met with a nest of a small Trigona (Abelha preguicosa) in a very narrow hole of an old canella-tree, where, from want of space they were obliged to give to their combs a very irregular shape, corresponding to the transverse section of the hole. These bees lived with me in a spacious box about a year (till Feb. 10, 1875), when, perhaps, not a single bee survived of those which had come from the canella-tree; but notwithstanding they yet continued to build irregular combs, while quite regular ones were built by several other communities of the same species, which I have had.

"The following case is still more striking. In the construction of the combs, for the raising of the young, as well as of the large cells for guarding honey and pollen, our Meliponæ and Trigonæ do not use pure wax, but mix it with various resinous and other substances, which give to this wax a peculiar color and smell. Now, I had brought home from two different and distant localities two communities of our most common Melipona (allied to *M. marginata*) of which one had dark reddish-brown, and the other pale yellowish-brown wax, they evidently employing resins from different trees. They lived with me for many years, and either continued, in their new home, to gather the same resins as before, though now, when they stood close together, any tree was equally accessible to the bees of either community. This can be hardly attributed to inherited instinct, as both belonged to the same species; nor to individual experience about the usefulness of the several resins (which seemed to serve equally well), but only, as far as I can judge, to tradition, each subsequent generation of young bees following the habits of their elder sisters."

ANTHROPOLOGY.[1]

LANGUAGES OF AFRICA.—In the Journal of the Royal Asiatic Society, Vol. XIV, p. 160 (April, 1882), Mr. R. N. Cust gives us a paper with the following title: "Notice of the scholars who have contributed to the extension of our knowledge of the languages of Africa."

The continent is thus divided:

North of the Equator. I. Semitic group.
II. Hamitic group.
III. Nuba-Fulah group.
IV. Negro group.

South of the Equator. V. Bantu.
VI. Hottentot-Bushman group.

I. SEMITIC GROUP = Ethiopic, Old Ethiopic or Geez, Amharic, Tigre and Harári.

II. HAMITIC GROUP = Berber (Old Mauritanian or Numidian), Kabyle (Showiah and Zowiah dialects), Tuaricks, Zenágas (S. of Sahara), Suvah, and the Ethiopic sub-group of Somáli, Galla, Beja-Bishari, Falasha (Abyssinian Jews), Wogos, Dankali, Agau, Barea, Saho, Kunáma.

III. NUBA-FULA GROUP = Nubian sub-group of Nubian or Barabra, Tumale, Masai, Kwafi, Monbutto, and Niam-Niam, and the sub-group of Fulahs.

IV. NEGRO GROUP.—

A. *Western Negro-land*, Atlantic side, Senegambia and Guinea coast: Mandingo, Serawale, Vei, Susu, Mende, Wolof, Sereres, Bullom, Temne, Sherbro—Bullom, Hausa, Sourhai (Timbuctoo), Kru, Grebo, Basa, Gwe, Yoruba, Ashante, Fanti, Akra (Gá), Affetu.

B. *Central Negro-land*, Basins of the Niger and the Tchad, Ibo, Efik, Nupe, Kanuri (Bornu), Baghirmi, Budduma, Logone, Wandala, Maba, Sara, Badi Baele, Kuka-Lisi.

C. *Upper Nile Basin*: Dinka, Shilluk, Bari, Bongo.

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